REMARKS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1-5, 7-13, and 15-22 are currently pending, with Claims 11-13, 15-18, and 22 being withdrawn from consideration as directed to a non-elected species. Claims 1-3 have been amended by the present amendment. The changes to the claims are supported by the originally filed specification and do not add new matter.[1]

In the outstanding Office Action, Claims 1-4 and 10 were provisionally rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over Claims 1, 3-5, 7, 8, and 10-12 of co-pending Application No. 11/020,192 (hereinafter "the '192 application") in view of U.S. Patent No. 6,816,555 to Sakoda (hereinafter "the '555 patent"); and Claims 1-5, 7-10, and 19-21 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application Publication No. 2004/0028004 to Hayashi et al. (hereinafter "the '004 application") in view of the '555 patent.

DOUBLE PATENTING REJECTION

With regard to the provisional non-statutory obviousness-type double patenting rejection, Applicants respectfully request that resolution of any double patenting issues be resolved during prosecution of the cited double patenting reference, which is the later filed application. Specifically, the present application has a U.S. filing date of October 7, 2003, while the double patenting reference (*i.e.*, the '192 application) has a U.S. filing date of December 27, 2004. Thus, the present application is the earlier filed application and the double patenting reference is the later filed application which is awaiting examination and may be rejected on grounds other than double patenting. Therefore, in accordance with

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[1] See, *e.g.*, page 26, line 26 to page 27, line 1; and page 30, lines 21-25 of the originally filed specification.

MPEP § 804(I)(B)(1), Applicants wish to prosecute the present application until such time as the double patenting rejection is the only remaining rejection in this earlier filed application, and permit this application to issue as a patent so that a non-provisional double patenting rejection may be addressed on the merits in the '192 application.

REJECTION UNDER 35 U.S.C. § 103

Amended Claim 1 is directed to a radio communication system for performing a radio communication by combining the OFDM modulation method and the CDMA modulation method, the system comprising:

> a transmitter apparatus, *including a single symbol arranger for each information channel* configured to arrange information symbols along a direction of a frequency axis in accordance with an arrangement pattern, configured to estimate conditions of propagation paths used in the radio communication, *to select the arrangement pattern for the single symbol arranger based on the estimated conditions of the propagation paths*, *to notify the single symbol arranger of the selected arrangement pattern*, and to transmit a radio communication signal including the arranged information symbols; and
>
> a receiver apparatus configured to receive the radio communication signal, and to rearrange the information symbols included in the radio communication signal along the direction of the frequency axis in accordance with a reverse pattern to the arrangement pattern.

Regarding the rejection of Claim 1 under 35 U.S.C. § 103(a), the '004 application is directed to a radio communication system with an adaptive interleaver. In particular, the '004 application discusses a system 10 that includes two or more types of interleaving, including bit, symbol, and chip interleaving.[2] The '004 application discusses that an optimum interleaving method depends on the level of inter-code interference, which depends upon the number of active codes. The '004 application discusses that the number of active codes generally is related to the number of users, and that symbol interleaving is advantageous when there are many active codes, while chip interleaving and bit interleaving are advantageous when there are fewer active codes.[3] Further, the '004 application discusses a communication system that dynamically selects between chip and bit interleaving depending on the current number of active codes.[4] The '004 application also discusses that the system may constantly monitor the received signal quality, S/N, the speech objective quality measure, and BER (or SER) and respond to changing conditions by way of changing the method of interleaving.[5]

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[2] See '004 application, paragraph [0024].

The Office Action cites paragraph [0040] of the '004 application, which discusses constant monitoring and responding to changing conditions by way of changing the method of interleaving, for teaching "to select an arrangement pattern for the symbol arranger based on the estimated conditions of the propagation paths."[6] However, it is respectfully submitted that the '004 application fails to disclose a transmitter apparatus configured to select the arrangement pattern for the single symbol arranger based on the estimated conditions of the propagation paths.

Rather, the '004 application discusses that the method of interleaving is changed, for example, using selectors 56a, 78a, and/or 68 controlled by control section 58. The '004 selector 56a selects the input from the bit interleaver 54a and if the number of active codes is less than or equal to a predetermined value, a control signal from the control section 58 causes the first selector 56a to select the signal from the encoder 52a. The '004 selector 78a is connected to a spreader 62a and selectively provides one of a modulated signal and a symbol interleaved signal to the spreader 62a, based on the control signal from the control section 58. Further, the '004 application discusses that the selector 68 selects between a combined spread signal and a chip interleaved spread signal, and is preferably controlled by the same control signal that controls the selector 56a.[7] The '004 application does not disclose that the control section 58, the selector 56a, the selector 78a, and/or the selector 68 ***select the arrangement pattern*** for any of the bit interleaver 54a, the symbol interleaver 76a, and the chip interleaver 66.

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[3] See '004 application, paragraph [0008].
[4] Id. at paragraph [0027].
[5] Id. at paragraph [0040].
[6] See Office Action dated January 5, 2009, page 4.

Further, it is respectfully submitted that the '004 application fails to disclose a transmitter apparatus configured to notify the single symbol arranger of the selected arrangement pattern. Rather, the '004 application simply discusses that the bit interleaver 54a performs bit interleaving on an encoded signal prior to modulating the signal, the symbol interleaver 76a performs symbol interleaving on the modulated signal, and the chip interleaver 66 performs chip interleaving on a combined spread signal.[8] The '004 application does not disclose that the bit interleaver 54a, the symbol interleaver76a, or the chip interleaver 66 is ***notified of the selected arrangement pattern***.

Moreover, the Office Action acknowledges, and it is respectfully submitted, that the '004 application fails to disclose "a single symbol arranger for each information channel as claimed." Rather, the Office Action cites the '555 patent for such a teaching. In particular, the Office Action states that

> Hayashi fails to disclose a single symbol arranger for each information channel as claimed. Sakoda discloses a transmitter comprising a single symbol arranger 31 (see figure 1A) for each information channel (see channels 1-M). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the above teaching of Sakoda to Hayashi, so that more information could be transmitted by using multi-carrier modulation (as suggested by Sakoda at column 1 lines 11-25).[9]

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[7] See '004 application, paragraphs [0029], [0032], and [0034].

[8] Id. at paragraph [0024].

[9] See Office Action dated January 5, 2008, pages 4 and 5.

However, it is respectfully submitted that there is no suggestion or motivation to make the above proposed modification, as the proposed modification would render the '004 invention being modified unsatisfactory for its intended purpose.[10] As noted in the Office Action, the '004 application discusses a radio communication system that is configured to monitor a received signal quality and respond to changing conditions by way of changing the method of interleaving. In particular, the '004 application discusses that **"[i]t would be advantageous to be able to dynamically select a desirable interleaving method based on various network factors."**[11] The '004 application discusses changing the method interleaving by, for example, selecting between bit and chip interleaving an active code signal, or selecting between symbol and chip interleaving the active code signal. Thus, if the '004 system were modified to include only a single arranger 31, as discussed in the '555 patent, the modified '004 system would be rendered unsatisfactory for its intended purpose, as the '004 system would no longer be able to dynamically select a desirable interleaving method based on the various network factors.

Further, it is respectfully submitted that the '555 patent fails to disclose a transmitter apparatus configured to select the arrangement pattern for the single symbol arranger based on the estimated conditions of the propagation paths, and to notify the single symbol arranger of the selected arrangement pattern. Rather, with respect to encoder circuit (interleave) 31 cited in the Office Action, the '555 patent simply discusses that, where an OFDM wireless communication system is applied to the transmission of an audio signal of for example the DAB system, since the bit signals of the information bit streams are audio signals, the encoder circuits 31_1 to 31_M encode audio signals. Further, the '555 patent discusses that the encoder circuits 31_1 to 31_M also interleave the signals according to need.[12] The '555 patent does not disclose a transmitter apparatus that is configured ***to select the arrangement pattern for the encoder circuit 31*** based on the estimated conditions of the propagation paths, and to ***notify the encoder circuit 31 of the selected arrangement pattern***.

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[10] See MPEP § 2143.01(V), "[i]f proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).
[11] See '004 application, paragraph [0009].

For a non-limiting example, in the claimed invention, the arrangement pattern for the single symbol arranger is selected based on the estimated conditions of the propagation paths. To be more specific, the arrangement pattern of the bit interleave is selected when the single symbol arranger is the first symbol arranger (bit interleave), the arrangement pattern of the symbol interleave is selected when the single symbol arranger is the second symbol arranger (symbol interleave), and the arrangement pattern of the chip interleave is selected when the single symbol arranger is the third symbol arranger (chip interleave).

In addition, positions in which the bit interleave, the symbol interleave, and the chip interleave are arranged are different from one another. Accordingly, the bit interleave, the symbol interleave, and the chip interleave cannot be switched within a single interleaver.

Thus, no matter how the teachings of the '004 application and the '555 patent are combined, the combination does not teach or suggest the transmitter apparatus defined in Claim 1. Accordingly, it is respectfully submitted that Claim 1 (and all associated dependent claims) patentably defines over any proper combination of the '004 application and the '555 patent.

Amended Claim 2 recites, in part,

> estimating conditions of propagation paths used in the radio communication, arranging information symbols along a direction of a frequency axis in accordance with an arrangement pattern by a single symbol arranger for each information channel, selecting the arrangement pattern for the single symbol arranger based on the estimated conditions of the propagation paths, notifying the single symbol arranger of the

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[12] See '555 patent, column 11, lines 7-14.

> selected arrangement pattern, and transmitting a radio communication signal including the arranged information symbols, in a transmitter apparatus.

As noted above, the ‘004 application and the ‘555 patent, alone or in proper combination, fail to disclose the transmitter apparatus defined in Claim 1. Thus, the ‘004 application and the ‘555 patent fail to disclose the selecting and the notifying defined in Claim 2. Accordingly, it is respectfully submitted that Claim 2 (and dependent Claim 21) patentably defines over any proper combination of the ‘004 application and the ‘555 patent.

Amended Claim 3 recites limitations analogous to the limitations recited in Claim 1. Moreover, Claim 3 has been amended in a manner analogous to the amendments to Claim 1. Accordingly, it is respectfully submitted that Claim 3 (and all associated dependent claims) patentably defines over any proper combination of the ‘004 application and the ‘555 patent.

CONCLUSION

Thus, it is respectfully submitted that independent Claims 1-3 (and all associated dependent claims) patentably define over any proper combination of the ‘004 application and the ‘555 patent.

Consequently, in view of the present amendment and in light of the above discussion, the outstanding grounds for rejection are believed to have been overcome. The application as amended herewith is believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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